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Effect of fluid pressure distribution on structural evolution of accretionary wedges

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Physical experiments of evolving accretionary wedges usually implement predefined weak basal décollements and constant strength parameters for overlying compressed sequences, although fluid pressure ratio, and therefore brittle strength, can strongly vary in sedimentary basins. A two-dimensional finite difference model with a visco-elasto-plasic rheology is used to investigate the influence of different fluid pressure ratio distribution on the structural evolution of accretionary wedge systems. Results show that linear increase in fluid pressure ratio towards the base leads to toeward verging thrust sheets and underplating of strata, while simulations with a predefined décollement form conjugate shear zones supporting box-fold type frontal accretion. Surface tapers are in agreement with the critical wedge theory, which here is modified for cases of varying fluid pressure ratio. Furthermore, numerical results resemble findings from analogue experiments as well as natural examples of accretionary wedges.